UNIVERSITY OF HERTFORDSHIRE

Faculty of Engineering & Information Science

BACHELOR OF ENGINEERING/SCIENCE DEGREE/DEGREE WITH HONOURS IN MULTIMEDIA TECHNOLOGY

Project Report

"COMPREHENSIVE TELXON TRAINING GUIDE"

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ABSTRACT

Comprehensive Telxon Training Guide has been developed for ASDA Stores. The report documents the development stages to create the successful project. At present, Asda currently uses a sophisticated barcode reader called the Telxon. The aim of the project is to provide a Telxon training package for the Asda employees.

The 3D simulation of the Telxon has been constructed using 3D Studio Max to incorporate in the training package. Macromedia Director provided the various multimedia aspects to advance the projects features.

A strategic design accompanied with vast research helped produce the best possible training package for Asda stores

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1 Introduction

For clarity, it is essential to define certain terms, which will be used throughout this project. The definitions below are used appropriately within the project:

Multimedia – is the integration of different media such as text, videos, and audio and animation images on a single document.
Client – the company or group the product is for. In this report the client is ASDA Stores Ltd
Users – the individual members of the company or group. This relates to ASDA colleagues anyone from shop floor clerks to managers.
System – is the term used to describe the project that is going to be designed and implemented for the client. In this case it is the Comprehensive Telxon Training Guide
Project – is the combination of the system and all the background research, designing and implementation.

1.1 Project Aim

The aim of this project is to create an interactive training package, which will provide training for the new and existing Asda colleagues. The training should show how to use Telxon for daily activities that are carried out in Asda stores. The training package is primarily aimed at the new users and will cater for existing users as help aids. The new system will eventually be based on server and will be only accessible in the Asda stores. It will also incorporate multimedia aspects to help the user to develop their Telxon skills.

1.2 Objectives

The main objectives of this project are:

- To provide users with a comprehensive training package that will enable them to learn and remember the different aspects of Telxon.
- To implement a detailed content, but also to enable the training to be carried as quickly as possible to reduce excessive time consumption.
- To create a detailed 3D model of the Telxon to use in the training package
- To research into other training packages. This will help present what makes a good training package and will be implemented in the new system.
- To carry out thorough research into what makes a good training program and Human – Computer Interaction (HCI)

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1.3 Authors Background and Reason for Project

The author is currently an employee of Asda Wal-Mart and has been with the company for approximately 4 years working in the Colindale superstore. From first hand experience the author felt that Telxon training was sometimes hard to obtain, especially if training part-time colleagues. The main contribution to the difficulty of training came down to training time available for the colleagues. Working in a large and busy environment means that there is little or no training time for the trainer or the trainee. This concern gave the author the idea of investigating the Telxon training problem further and possibly proposing a feasible solution.

1.4 Choosing a Methodology

It is very important to establish a methodology as this can help to prevent abnormalities developing in the system and thus should result in less problems and errors. There are two main types of models, which can be adopted - the Waterfall/Cascade or the JAD models.

Waterfall or Cascade model is the most common method used when developing new systems. The key feature of the Waterfall model is that each stage must be completed before starting the next stage. If the stage cannot be completed then the stage prior must be re-examined.
The system development life cycle can help to guide and plan the development of the project efficiently and effectively. This is why this Methodology was chosen.

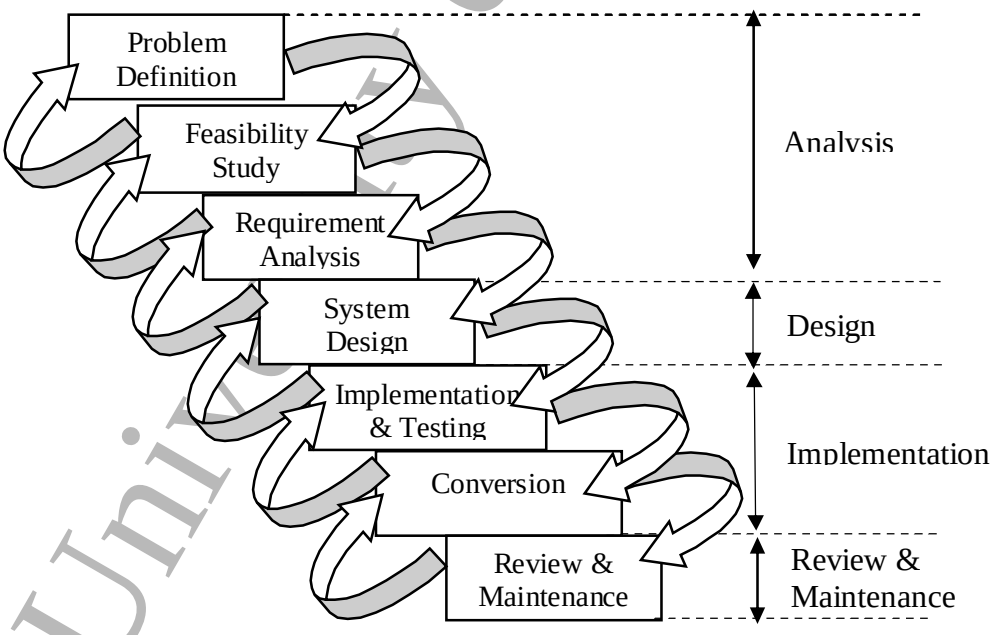

Figure 1: Shows the different stages of the Waterfall Model and how they are related.

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A brief introduction of each stage is given below:

1.4.1 Problem Definition

Clearly identify the problems with the current system through the 3 methods of investigation: Observation, Questionnaires and Interviews. Without a detailed definition of the problem, the developer will be unsure of the task to achieve.

1.4.2 Feasibility Study

An investigation is essential to determine whether a project or system is feasible. The study involves the investigation of 5 main factors, these are as follows:-

- *Technical feasibility* – What technology is available to help with the implementation of the system.
- *Economical feasibility* - The new system must be cost-effective. If the costs of the new system outweigh the benefits, then the project should not be not be implemented.
- *Legal feasibility* - This determines whether there is any conflict between the new proposed system and legal requirements such as the Data Protection Act.
- *Schedule feasibility* - The new proposed system must be completed within a given timeframe if set.
- *Operational feasibility* - This study involves looking at the current training methods and evaluating whether it can fully or partially support the new system.

1.4.3 Requirements Analysis

The requirements analysis stage can only be applied if/when the proposed system is proven to be feasible. Within this stage, discussions with the client or user will be carried out. Special requirements or specifications if any might be required for the system, such as different audiences, time for completion and content.

1.4.4 System Design

This stage of the system life cycle cannot be carried out before all the requirements have been analysed and set. Designing the system is a major contributor to creating a successful project. To do this it will be easier to break down the design process in to sub-sections, such as database design, user interface, system layout, navigation and program design. Storyboarding may be necessary to show the flow of the training modules.

1.4.5 Implementation and Testing

This stage is usually the most time consuming of all the stages. Similar to the System Design stage, it will be easier to break the implementation into smaller section and then merge them together.

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Tests will need to be carried out during the implementing stage and once the system is fully implemented, the entire system is re-tested.

More of than not testing is carried out in conjunction with the implementation of the system and after the full implementation of the system the entire system is tested for errors.

1.4.6 Conversion

The conversion stage involves the following:

- *Hardware installation*
- *File conversion*
- *Staff training*

Once the testing of the system has been fully implemented, tested and accepted, the conversion process can be applied. This can be done using the following strategies:

- *Direct Changeover* – where the user stops using the system one day and begins to use the new system.
- *Parallel Conversion* – is where the current and new systems are used alongside each other. This is usually carried out to ensure the results of the new system are the same as the old method.
- *Phased Conversion* – usually used in large systems, where the current system is broken down into individual modules so that the conversion can be implemented module by module
- *Pilot Conversion* – similar to the parallel conversion but the new system is usually introduced to a department within an organisation to test it for satisfactory outcome before it is fully converted to the main system.

1.4.7 Review and Maintenance

This is the final stage and is only carried out when the system is fully converted to a 'live system.' A review method needs to be devised to assess how well the new system is doing, in order to check if it is meeting the criteria set and to identify any strengths and weaknesses, as well as any possible improvements.

Maintenance means to uphold the system either by contracting to an external source or installing software with the new system to help maintain it. Maintenance can be divided into the following categories:

- *Perfection Maintenance* – making improvements by possibly making the system easier to use or adding new facilities.
- *Adaptive Maintenance* – updating the system for the change of requirements, circumstances and legislation of the business.
- *Corrective Maintenance* - solving any errors that appear.

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- *Documentation Maintenance* - documenting the updates and errors

1.5 The Report Overview

The report provides a detailed document highlighting the work which was carried out for this project. It is written to help any developer who may take the project on to learn from it and possibly develop a new version of the system. Extensive research has been outlined in the report, which was used to design and construct the system. The report discusses and evaluates both the success of the project and how any problems were overcome. Possible improvements have also been analysed in the report including constructive feedback from possible end users.

There are eight chapters in the report

Chapter 1 - Introduction

This chapter includes the project aims, objectives, author's background and reasons for the project. Also included in this chapter is System life cycle adopted to the project.

Chapter 2 - Background Information

This chapter involves an introduction to Asda Wal-mart and the Telxon and smart system. An analysis of current training methods is also included and derived from this is a user requirement.

Chapter 3 – Project Timeline and Methodology

An overview of how the project is conducted is discussed in the chapter. Project development is described in a stage by stage process.

Chapter 4 – Research

This chapter consists of a brief description of primary and secondary research as well as the human relationship of human computer interaction with the project.

Chapter 5 – System Design

The creation of the system is described in this chapter. It illustrates the step by step process in which the system is developed. Also possible software packages to implement the design are evaluated.

Chapter 6 – Implementation

With this chapter a detailed design of the application is provided. It has a break down of each of the stages and problems that occurred during the implementation an how they were overcome.

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Chapter 7 – Testing

The chapter is involves the testing of the application, both the system and user testing.

Chapter 8 – Evaluation and Conclusion

This chapter comprises of a project evaluation, project management, alternative methods, future work and restrictions on the project. It concludes with an overall summary of the project.

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2 Background Information

2.1 Introduction to Asda Wal-mart

Asda Wal Mart is one of the leading supermarkets in the UK and currently employees 109,000 people (employees) over 245 stores nationwide. On 26th July 1999 Asda stores became part of the Wal-Mart family thus bringing in new changes and more advanced systems. Wal-Mart has always used cutting edge technology in the day-to-day running of their business and when they merged with Asda they introduced a new system called 'Smart' to Asda stores UK.

2.1.1 Asda Store (Colindale)

This is a large superstore, consisting of approximately 360 employees. The Store is located in a town in North West London. The General Store Manager of the store is Mr David White.

2.1.2 General Store Manager

David White's role in the store is to carryout day-to-day business of this store, ensuring the 'Sales' reach their target, 'Waste' is in line with the company's guidelines and making sure that the store does not over spend on wages.

2.2 Introduction to The Telxon and Smart System

Telxon is a specifically designed portable inventory bar code reader that can perform various tasks. It has been recently introduced to Asda stores in the UK and is one of the most important equipment used in Asda today. Telxon is integrated and supported by a unique system called Smart. Smart can manage the links of checkout registers, tracks inventories and can automatically re-order goods from suppliers when stocks run low. It can also process tasks such as price changes, payrolls, staffing levels and report any anomalies to managers. Since the introduction of the Smart system and Telxon, manual ordering of stock has almost become extinct in all the stores. This has meant more colleague hours are spent replenishing stock and therefore improving availability.

2.3 Analysis of The Telxon

Supermarkets like Asda Wal-Mart considers the demands for an effective and efficient workplace highly and emphasises on continuous improvement, higher productivity and a client focus. For this to succeed the industry needs a highly skilled and flexible work force.

The Telxon is used on a daily basis by all the individual departments in Asda. There are a number of jobs which must be done on a day to day basis and these are monitored by the store manager and head office. Some of these jobs are as follows:

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- Waste – Scanning items which are not for fit for sale
- Price Changes – renewing and finalising prices that have been increased or decrease
- Whoops (price reduction) – reducing items that are coming to their shelf life
- SEL (Shelf Edge Label) checks – ensuring all prices are correct, if not, then printing the correct ones
- Trailer Listing – Scanning products that need to be reduced the following day
- Off Sales – products that are not available on the shop floor are scanned and checked

2.4 How The Telxon Works

Telxon has many functions that can help ensure the jobs and targets (mentioned above) are met. The Smart system has inventory section, which have been used to keep stock levels (Perpetual Inventory) correct at all times. This enables the correct stock to be delivered to the store, helping meet sales targets as reducing the possibility of overstock. Telxon is used to scan waste (products that are not fit to be sold for various reasons) everyday. When products are wasted via Telxon, the Smart system automatically updates the Inventory level of that particular product. It is clear that Telxon plays an important role in helping the store reach its target.

All access to Telxon are restricted by the Smart system. An Asda colleague requires a User ID and Password to be able to access the functions.

2.5 Equipment Associated with The Telxon

There are other equipments that are associated with Telxon. These equipments are not always required to carry out the jobs.

- Portable Printer – performs the printing of the labels.
- Labels (Fresh whoops, large SELs, Small SELs, Pegs labels) - required for printing
- Main Printer – prints the POS and reports that can not be performed by the portable printer. Usually found in the Admin Office.

2.6 Investigation of the Current Method of Training

When creating a new system it is essential to analyse what the current system is and what the advantages and disadvantages are. The facts presented from the investigation will help to design and implement a better system. There are many ways to investigate the current system including Observation, Interviews and Questionnaires.

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2.6.1 First Hand Observation

As the author is a current employee of Asda and therefore has firsthand experience with the current method of training. Being a key colleague and trainer of Telxon, it was regularly observed that it was hard to find time to train new or existing colleagues on busy trading days such as Saturday and Sundays. On occasions, it also was found that trying to obtain help for training colleagues on Telxon was difficult especially when working during the evening shift and night shift. Using Telxon is a skill and can take many years of practice to be able to perform with it. Also during the observations, it was noticed that not all colleagues are given permission to use Telxon.

2.6.2 Interview

Another method was used to investigate the current system this was by interviewing the store manager. The aim was to extract information from a different perspective on the current methods of training adopted. The interview with Mr David White was arranged and the questions for the interview were prepared beforehand. The questions asked can be found in Appendix A.

2.6.3 Summary of Interview

During the interview with Mr White, a number of weaknesses in the current system were highlighted.

The manager outlined that the two biggest problems are the lack of training time available and, on occasions colleagues forget how to carry out some of the tasks on Telxon, especially if the colleague has been away from the job for a long term. The training for that colleague has to be then supplied by their manager or key colleague. Training can be further delayed when a key colleague or manager is unavailable due to other commitments. Another key point mentioned was that there are employees in the company who are part-time workers and work during very busy trading hours. As a result, availability for Telxon help is limited and therefore getting daily Telxon jobs may take longer to do and on rare occasions are overlooked.

Mr White also mentioned training manuals, which are available for Telxon users. The manuals are on paper format, in black and white. It is mainly compromised of text therefore coming across as unattractive; as a result they do not get used very often by employees or management team

2.6.4 Questionnaire

A questionnaire was devised after the interview with the store manager in order to summarise the user's perception of the current system and highlight any problems. The questionnaire was completed by ten Asda colleagues from the Colindale store. A copy of the questionnaire can be seen in Appendix B.

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2.6.5 Results of the Questionnaire

The key results of the questionnaire are shown below:

- 10/10 people questioned develops queries or problems during the use of the Telxon.
- 7/10 people who developed problems went another colleague to receive help.
- 8/10 people had forgotten some aspects of their training
- 1/10 people used the Telxon manual to solve their problems.

From the result it can be concluded that there are issues when using the Telxon and these are being resolved by other means instead of by the proper procedures.

2.6.6 Summary of the Current System and Problems

- Employees are trained by a key colleague or the department manager usually on the shop floor.
- Colleagues have access to the manual and documents to help aid the training.
- Efficiency: The problem arises when key colleagues and managers are not available to help the colleagues to train and tackle any queries
- Content Information: The manuals for Telxon can be difficult to understand and follow.
- Training someone on Telxon varies, some jobs take longer to understand than others and some people take longer to learn different jobs.

2.7 Definition of the Target Audience

Target audience or end users can play an important role in developing a new system. As the investigation was carried out in the Colindale store, the target audience for the new system would be the current and potential employees of the Colindale store.

2.8 Requirement Analysis

Having defined the target audience, user requirements need to be set to provide a guideline for the new system. These are usually developed with the aid of the users or client. For this system, both the client and the user's requirements were discussed and set. These requirements have been divided in to general and specific as shown below:

2.8.1General User Requirements

- be reliable
- be user friendly
- be easy to navigate
- contain relevant media such as text, graphics, animation and video
- contain good use of colour
- the content should be clear and concise

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- the system should look professional
- have quick access time throughout the package
- provide interaction
- use of short but detailed information

2.8.2 Specific User Requirements

- The package should only be available for ASDA colleagues only within their premises
- The package should contain Asda Wal Mart Logo for professional look
- It should take no longer than 12 weeks to implement and document the new package
- There should be a basic login system implemented to avoid unwanted viewing of materials
- The training should be split in to different modules
- the system has to be standalone, it can not be connected to the Smart system because of the high risk involved
- It must cater for existing users that need quick training help.
- Create a 3D image of the Telxon to help explain the functions of it.
- Implement a simple testing system to help guide the users.

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3. Project Time Plan

3.1 Introduction

Having established the requirements, the next step is to develop a suitable project plan. Scheduling and time management are important factors to consider for this project to be successful. If important time targets and deadlines are missed, it can lead to failure and uncontrollable errors. This also can cause anxiety, frustration, guilt, and other negative feelings for the developer. All this can be avoided by setting appropriate schedules, methods and by taking into consideration if something does go wrong.

3.2 Stages of Work

After carefully analysing the requirements, different stages of work were developed. Each stage indicates the project work that needs to be completed and how much time was assigned for each stage.

3.2.1 Initial Research - one week for completion

- Investigating similar training programs that are used by Asda and research similar training packages on the internet
- Possible software and programming languages that could be used to aid the implementation

3.2.2 Content Preparation – two weeks for completion

- Define the levels that is to be implemented in the system with the associated Telxon jobs
- Collecting content material such as Telxon manuals, video clips and photographs of the Telxon in different angles to create to the training package

3.2.3 Design and Implementation

This section is the most time consuming and therefore is given 5 weeks to complete.

- Produce a fully annotated storyboard of the system and present it to the client. Make any changes that may develop
- Design and implement the structure of the system first i.e. building all the pages before creating the interface, using active server pages to create the login and administration system.
- Design and implement the user interface for all the pages within the system
- Implement the actual training package using the video, text, animation, and incorporate it with the rest of the system.

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3.2.4 Testing

- Testing is to be carried by both the author and end users for any errors and possible improvements. It must be completed by week 10 in order to be able to show the fully working system to the moderator and supervisor.
- Test to assess how well the training package is created by getting an Asda colleagues to use the training package with the Telxon.

3.2.5 Evaluation

Discussing the feedback from the user's personal opinions and assessing future developments for the system

Present any problems and a development plan in the report and submit the report for the 20/5/2003

3.3 Gantt chart

> *A Gantt chart provides a graphical illustration of a schedule that helps to plan, coordinate, and track specific tasks in a project.* [ref 1]

A Gantt chart (see appendix C) was produced to give a clear illustration of project tasks that needed completed during certain stages of the project. The Gantt chart may have to be adjusted frequently to reflect the actual status of project progress because almost inevitably, some tasks may diverge from the original plan.

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4 Research

4.1 Introduction

Research is essential in the creation of a new system and many projects have failed due to the lack of research conducted by the project developers. Having accepted the feasibility findings and user requirements that were set, the aim for further research was essential to help to fulfil some of criteria when designing the system. Two sets of research were conducted and summarised.

4.2 Primary Research

The research which was carried for this project mainly emphasised on the question, *"What makes a good training system?"*

To answer this question, the research was split up into three sub questions, these questions are discussed below:

4.2.1 Question 1: *What is a training package?*

A tool developed for an end-user to improve or enhance their skills in a particular subject or task.

4.2.2 Question 2: *What is the difference between traditional training methods and computerised training?*

Many differences were discovered during the research, the important difference have been put in to a table.

Computerised Training	Traditional Class Room Training
Convenience - Does not require having an instructor to schedule around. They are available at any time.	Need for a trainer is essential and training can not be done with out he/she.
Computerised teaching can be set so that it can provide the user with what they want to learn.	Training must be presented to many students all who have different needs,
Training is assembled so that it will proceed at a pace you are comfortable with.	All trainees have to learn at the same time. This can either lead to some trainees to wait around whilst others catch up.
Cost-Efficient: Computerised system can train one user or thousands with just one computerised system	One trainer has to perform the training more than one time if there are many trainees.
Consistency - All training subjects have identical quality, content and orientation.	The trainers are prone to forgetting some things which could be costly.

Fig 2: Table Explains important difference between traditional training and computerised based training.

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4.2.3 Question 3: *What types of computerised training packages are there?*

It was discovered that there are two main types of computerised system used for training purpose. One is the text-based package, which made up of mainly text and a few pictures and another type is multimedia-training package.

The most effective training packages present today are Multimedia Training packages. It is increasingly being used by developers to create advanced systems that can present high levels for training with higher degree of success.

Multimedia training packages have the following advantages over standard computerised training packages.

- Cost-Effective - Multimedia training has proven to be a fraction of the cost of conventional peer-to-peer training
- Retention -The highest level of retention is achieved through the process of "seeing, hearing, reading and doing"
- High Impact - Visual medium proven most effective training

4.2.4 Summary Primary Research

From the primary research it can be seen that the most obvious training package to develop is a multimedia orientated system.

4.3 Secondary Research

Having established that Multimedia Training package is the ideal method for the new system is not enough to start the designing and implementation.

More research is needed about the Humans interaction with computers. The aim of this research was to develop an idea of how Human computer interaction factors can be integrated to make a successful system.

4.3.1 Human Computer Interaction (HCI)

> *Human – computer interaction is the study of the relationships which exist between human user and the computer systems they use in the performance of their various tasks* [ref 2]

An objective of HCI is to allow interactions between the user and the interactive system, thus making it easier to use, more appealing and providing greater satisfaction. This is achieved by placing the user, in this case the colleagues of Asda, at the heart of the design process. The user's needs are valued more than the technical issues for the system.

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HCI is important when developing a system that involves the user to interact in any form. The goals of HCI are to develop and improve computer-based systems so that users can carry out their work

- *safely*
- *effectively*
- *efficiently*
- *enjoyably*

Ignoring HCI can lead to lack of the above as well as leaving the user frustrated, annoyed, scared and making them feel they have failed.

The new system is essentially a learning tool in the form of a training package where Human interaction plays a key role. Therefore, consideration of the human factors needed to be applied when designing the systems user interface.

Web sites are usually created based largely on HCI and therefore a similar standard could be integrated when designing the training package.

Below is a list of standards that are considered by website designers and can be adapted to the designing the new system: -

- *Physical attributions* – in terms of ergonomics
- *Cognitively behaviour* – through problem solving, searching and manipulation
- *Emotional factors* – the system should not cause anger, insult, fear or frustration
- *Perceptual factors* – by means of colour, layout and ease of navigation.

Both the interaction by the human and needs of the system are equally important. Both need a fine balance to give a complete satisfaction of the new system.

Sutcliff (1995) describe seven principles of human computer interaction. These principles have been analysed and adapted to how it can be applied to the new system.

1) The system will contain standard patterns, in terms of layout, colour and text type to maintain consistency

2) The system will have to meet the users expectation throughout the interface design.

3) The system will need to contain predictability by the use of messages, prompts and help guides where appropriate. This will help the user go use the system without problems

4) In accordance with predictability, the user should think he/she is in total control of the system. A user that does not feel as if they have control will loose interest with the system and therefore will hinder the learning process.

5) The system should cater for some users that have different learning speeds, for example, giving the user controls.

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6) The system will need to prevent errors and time wasting by allowing the user to achieve their goals efficiently. Implementing a search facility or creating access to information through minimal steps can achieve this.

7) The system will display information that is only relevant. This will disable the factor of overburdening the user's memory. The system will need to consider the language style suitable for the user, for example, not using of jargon and complex language.

4.3.2 Summary of HCI Research.

The aim of this research was to find out what principles can be drawn and used to help the creation of the new system. The findings above will be carefully considered and will be used in the designing of the system.

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5 System Design

5.1 Introduction

Content preparation and designing are important stages for a successful project. This is to be carried out before implementation can begin. There are many ways to design a system and not all are suited for every project. During the designing of the system, all the aspects that are discussed in Chapter 4 – Research – were taken into consideration and the aims and objectives of the project were recited. Once the designs were accepted, a suitable software or language was chosen to carry out the implementation. All software was chosen on the basis that they were available either at university or via personal arrangements.

5.2 Content Preparation

Content preparation was carried before any designing was done. A list of possible pages with relative literature was generated. These pages were split in to Output pages and Input pages. Each page was then given a user access level. The levels correspond to what type of user will be able to view the pages.

5.2.1 Outputs Pages

About the Guide * – gives brief introduction to the guide

Password Help* – shows where to get password

Terms and Condition* – outlines the Asda regulation of the Telxon use

Incorrect Login * – if password or user Id is wrong then this page will be prompted

About Telxon **– shockwave movie showing the different aspects of the Telxon.

Level 1 Module** – contains level 1 shockwave movie of Introduction of Telxon and PI

Level 2 Module **– contains level 2 shockwave movie of Reduction and Waste

Level 3 Module** – contains level 3 shockwave movie of Off Sales

Frequently Asked Questions** – linked to other pages related to the 3 level modules

Level 1 Test ** – tests the users knowledge of the literature in Level 1 module

Level 2 Test ** – tests the user knowledge of the literature in Level 2 module

Users Id Listing ***– contains the list of current users

5.2.2 Inputs Pages

Login *** – input values User ID and Password

Edit Colleague's Password ***– input values enter new password

Add New Colleagues *** – User Id and Password

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* User do not require to login

** User who have been given a User Id and Password to access these pages

*** Admin access

5.3 Content Flow Chart

Having developed an idea of what content was going to be included, a content flow chart was drawn up. The content flow chart gives a graphically representation of how the content is structured in the system. The content flow chart developed for the new system is shown below:

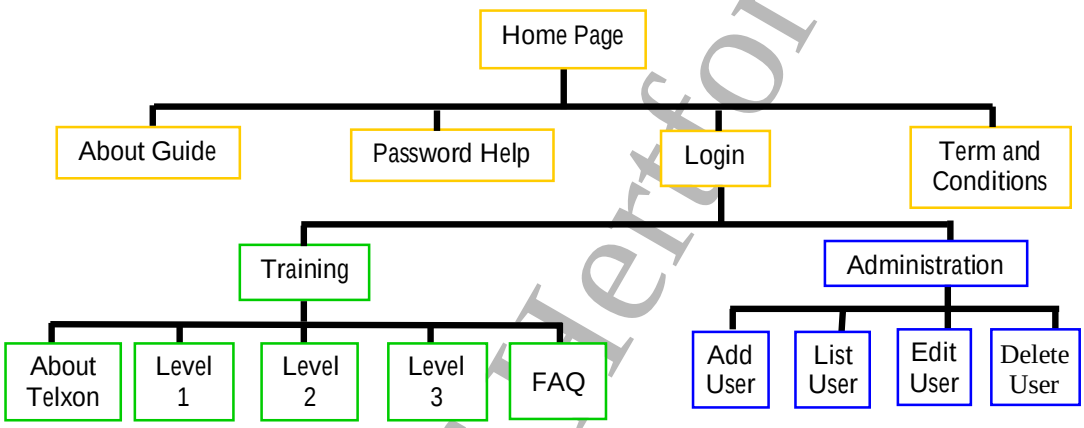

Figure 3: Content Flow Chart

5.4 Navigation Design

Having developed an idea of what content was going to be included, a content flow chart was drawn up. The content flow chart gives a graphically representation of how the content is structured in the system. The content flow chart developed for the new system is shown below:

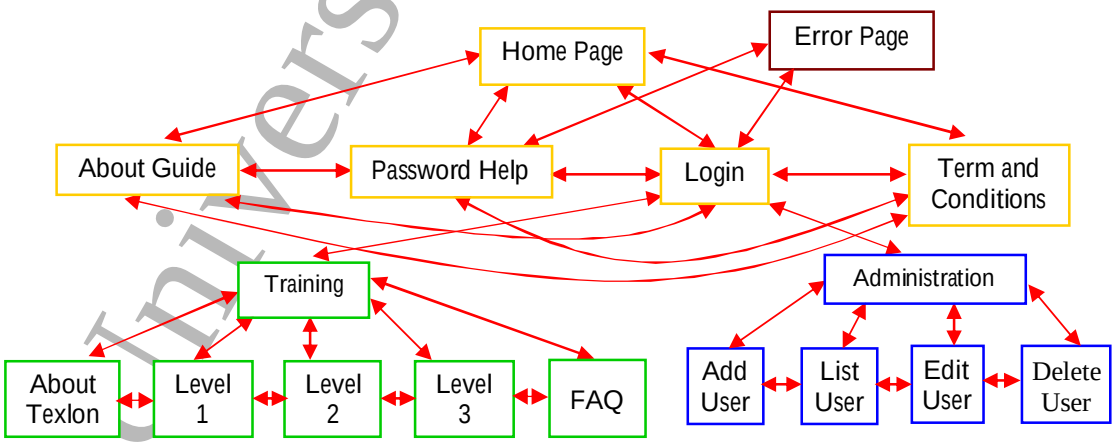

Figure 4: Navigation Design

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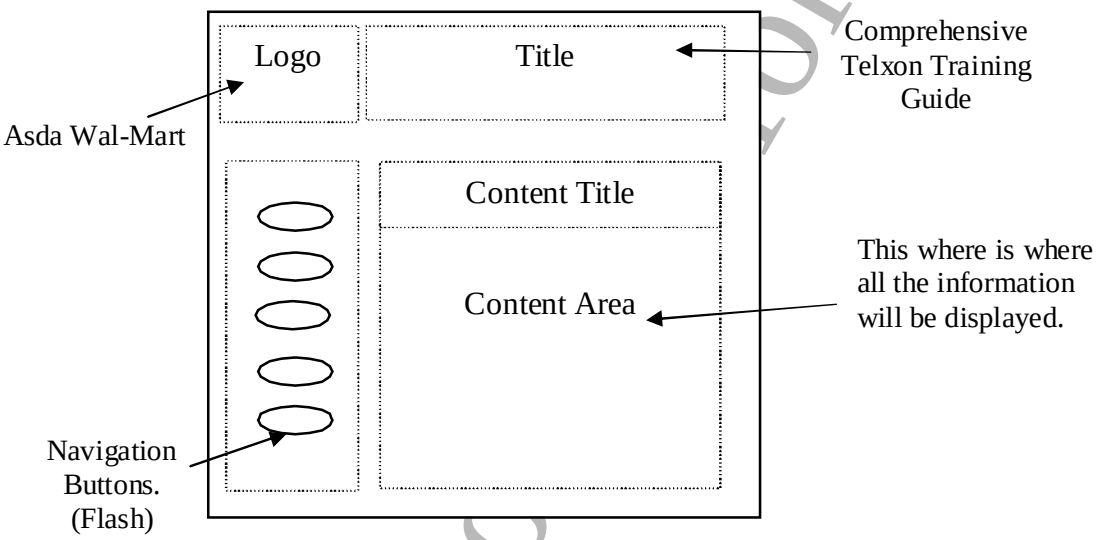
5.5 General Page Design

The whole system was designed to look like a website to demonstrate professional levels of presentation. All contents would to be presented in the same page format. This will give predictability and consistency throughout the system and by doing this it should make it more appealing.

Several designs were generated using sketches and block diagrams. These designs were shown to 5 potential end users, they were asked to assess and choose the best one. The block diagram below was proved to be the most popular and was to be the eventual design:

Figure 5: General page design



Possible Software to Implement the Design

- ***Macromedia Dreamweaver***, is an advanced web authoring program, designed to create dynamic web pages, for any sized websites from one page to several thousand pages. Dreamweaver lets you edit HTML and Active Server Pages directly, and then preview your work in the browser of your choice. Graphics and movies from Macromedia Flash, Fireworks and Director can be directly introduced and used from within Dreamweaver itself. HTML coding is automatically generated by the software, which saves coding time.

  Other Software available: FrontPage, Macromedia Flash, Macromedia Director

- ***Adobe Photoshop,*** presents editing and manipulation of all types of images. It contains wide range of functions that can help create an idyllic image for example Logos and Banners. It can also compress images to certain file size which is ideal for web page development

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5.6 Database Design

A database was needed to hold all the information for the login system. Only one table was needed due to the number of fields that was required.

The fields are as follows:-

- Id – Unique field Identifier (Auto Number)
- User Id – colleague number (Text)
- Password – chosen by the user (Text)

Possible Software to Implement the Design:

Microsoft Access is a database developing software, which is fairly simple to use with the aid of the 'wizard' facility. The software helps to store and manage information that is necessary for creating the login system. The information can be updated automatically with web developing tools.

Other software available: Oracle

5.7 Login System Design

The login system is needed to restrict access to important information for certain users. This access can be restricted by only giving the access to those who have a correct login ID and Password. This system is shown in a diagram below:

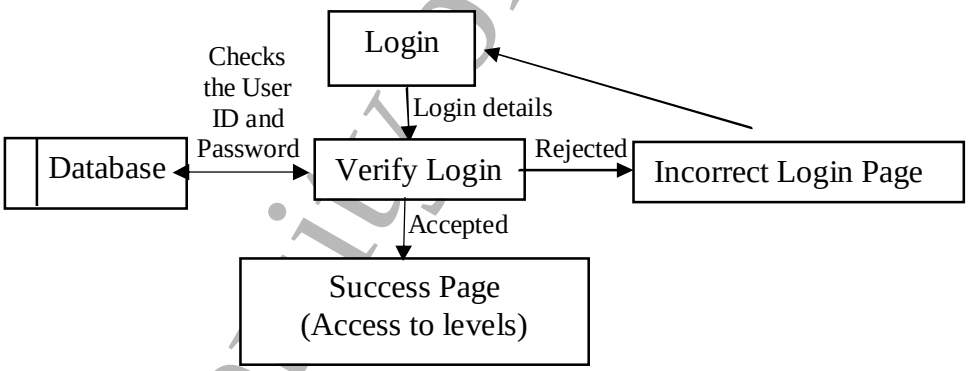
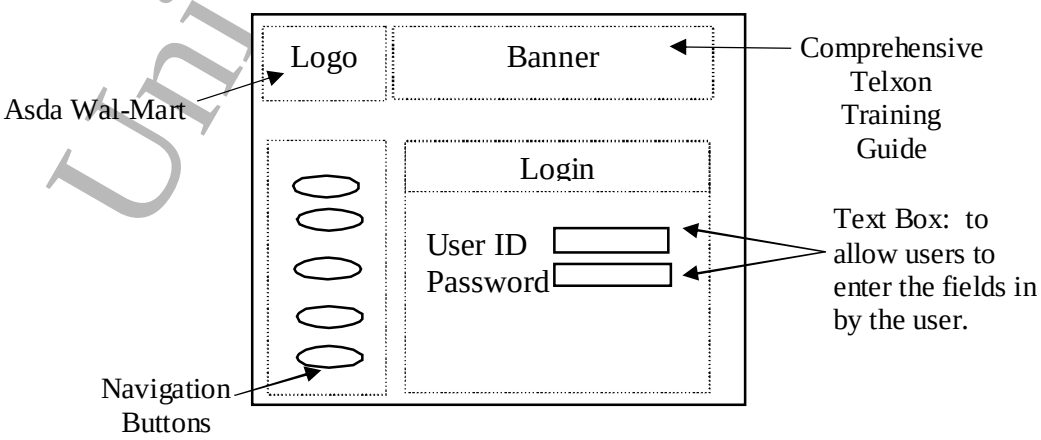


Figure 6: Login Systems Design shows the processes that occur during login.

Figure 7: The Login Page interface design is shown below:



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Possible Software and Language to Implement the Design:

- **Active Server Page** (Back End implementation)

  Active Server Pages are files that are located on the web server with an extension .ASP. This technology enables web servers to interact with database information. ASP uses scripting methods such as JavaScript and Visual Basic Script to manipulate databases that provide information on to a web page. The manipulation includes inserting, displaying, updating and deleting of rows of information within the database via the web page.

  Other language considered: Visual Basic and JavaScript.

- **Dreamweaver** (Front End implementation)

5.6 Administration System Design

As the store employs new colleagues on a regular basis, the need to give new colleagues login access will be fairly frequent. It was decided to create a simple administration system that allows new users to be added by an administrator. The system can also incorporate a method of changing and checking current employees' password and ID. This method will be much more efficient than getting someone to change the database and then uploading it to the system. One of the specific requirements was not to give the user access to register themselves because only selected Asda colleagues are given permission to use Telxon. The administration system is therefore is the only way colleagues can be given access to the information provided on the system.

The administration system will need to have a separate login system with a completely new table on the database or have another field asserted to the table in the database that can distinguish between a normal user and administrator. The later option was more practical and therefore the login system design was changed.

A field, 'isAdmin', a Yes/No field type, whereby the field can only take a value of yes or no needed to be added to the database table. The purpose of this filed was to distinguish between an admin user and a normal user.

This caused a change to the Login system, the previous designed login system had to be merged with the administration system. The new login design is shown below:

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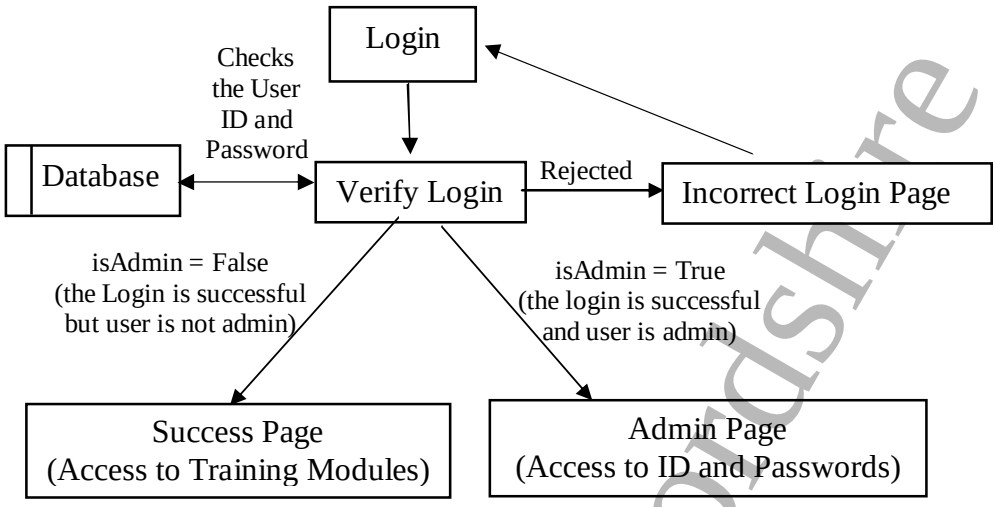
Login
Checks the User ID and Password
Database
Verify Login
Rejected
Incorrect Login Page
isAdmin = False (the Login is successful but user is not admin)
isAdmin = True (the login is successful and user is admin)
Success Page (Access to Training Modules)
Admin Page (Access to ID and Passwords)

Fig 8: Administration and Login system Design

5.7 Model Design

Creating a 3D model of Telxon was going to be a big challenge in terms of preparation and designing before hand. To get the model to look near enough to the real thing the following factors needed to be assessed before implementation could be carried out.

- The proportion – creating scaled drawings to keep the dimension regular.
- Colour – all colours on the Telxon needed to identified using a graphics package
- Detail level – how much detail was going to be incremented

Possible Software to Implement the Design:

3D Studio Max is used by many multimedia developers to create 3D models to enhance their packages and to give a 'new dimension' to the way pictures are viewed. With the wide range of options and functions 3D Studio Max can also help animation to be created.

5.8 Main Training Modules Design (About Telxon and Level 1,2,3)

The training modules are the most important part of the system and therefore great time and consideration was spent developing the designs.

All four training modules were designed so that the end product was easy to read, appealing and affective learning tools. The training modules had to be designed so that information could be presented to the user by the means of different media such as text, video, animation and images. The all 4 training modules (About Guide, Level 1, Level 2 and Level 3) was decided to be implemented as a movie, which gave the user the control to go at their preferred pace. It was also decided that audio needed to be included in the design because it provides a different way of learning. The designs for the training modules were carried out by means of storyboarding, these can be found in Appendix D.

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5.8.1 Storyboarding

Storyboards are a sequence of snapshots which focus on the main actions in a possible situation [ref3]

Storyboarding can be carried out in several different ways but the general aspect is the same for all storyboards. Objectives of storyboarding is to describe by graphics and text of what menu screens will look like; what pictures (still and moving) will be seen when and for how long; what audio and text will accompany the images; either synchronously or hyper linked. The storyboard can also be shown to the client to get feedbacks before creating the system.

Possible Software to Implement the Design

- ***Macromedia Director*** is an advanced authoring program that allows incorporation of many elements such as QuickTime movies, Shockwave movies, and CD-ROM Data, text, Macromedia Flash files and graphics into either a single or a collection of interactive learning tools. Director is used in many educational institutions for interactive presentations.

  *Other software considered***:** Flash and Authoware
- ***Adobe Premiere*** is the most adaptable Digital Video editing tool on the market today. With Premiere you can work more productively with Real-Time Preview. It is a powerful video and audio tools, that can help create extraordinary video productions.

  Other software considered: Windows Movie Maker and Apple
- **Adobe Photoshop**

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6 Implementation

This section describes how the system was implemented and the program used. An overview of the implementation is provided with problems that arise during this stage are stated and explained.

6.1 3D Telxon Implementation

The Telxon was created using 3D studio Max 3R. Throughout the creation the scale drawing and simple primitives were used along with various finishing tools to help create a life like model. The Model was created in 5 main steps.

6.1.1 First Step: Basic shape of Telxon

Using primitives (*Box and Tube*), the basic shape of the Telxon was created. The primitives were sized to scale and were edited using *Modifier* tools such as *EditMesh* and *FFD 3x3x3* to obtained the accurate shapes. Each individual shape was then positioned accurately using the positioning tools.

Example: Figure 9(a) and 9(b) shows how *3x3x3 Modifier* and *Uniform Scale* was used to create the curves on the Telxon front end

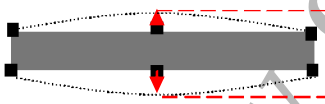

Figure 9(a): Box Primitive

Figure 9(b) End Result

6.1.2 Second Step: Adding Details to the shapes

To get the shapes to look identical to the real thing, further editing had to be implemented.

On most occasions the shapes needed Boolean tool to subtract or add (union) other shapes from it.

Example: Figure 9(c) shows result of how a detailed Ariel was implemented with the use of *Compound Object* tool called *Boolean*.

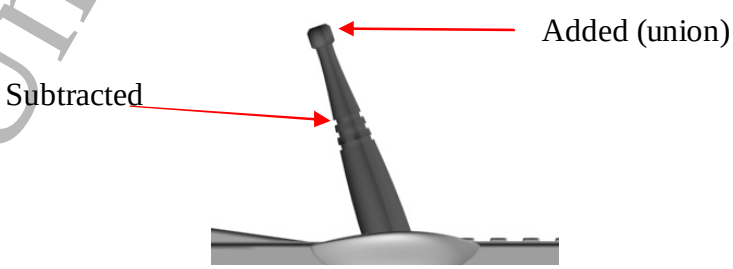

Figure 9(c): 3D Ariel

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6.1.3 Third Step: Adding text

Introducing flat text on the buttons (surface) was done using *Text* tool on the *Spline* menu. The text was written and then *Extruded* just above the surface so that it can be seen.

Incrementing text on the Battery model proved to be a bit more difficult. The text for the battery was created on new file, rendered and saved as a bitmap image Fig 9(d). This bitmap image was then imported on to the Battery model using Material Editor (Mapping) and applied to the shape of the battery fig 9(e).

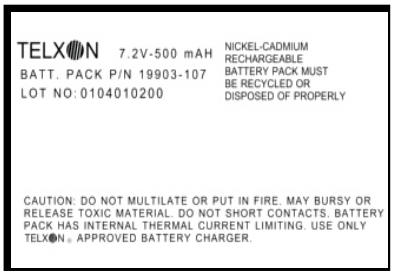
TELXON 7.2V-500 mAH
BATT. PACK P/N 19903-107
LOT NO: 0104010200
NICKEL-CADMIUM RECHARGEABLE BATTERY PACK MUST BE RECYCLED OR DISPOSED OF PROPERLY
CAUTION: DO NOT MULTILATE OR PUT IN FIRE. MAY BURSY OR RELEASE TOXIC MATERIAL. DO NOT SHORT CONTACTS. BATTERY PACK HAS INTERNAL THERMAL CURRENT LIMITING. USE ONLY TELXON APPROVED BATTERY CHARGER.

Figure 9(d): Bitmap Label

\+ Imported, rotated 270 degrees and mapped on to the Battery =

Figure 9(e): 3D Battery

6.1.4 Fourth Step: Adding Colour and Materials

3D studio Max contains standard materials that were used to help give exact colour representation to the real Telxon. Example of a material used was *Dark Gold Material*. This was applied to the Pins on the back of the Telxon. Other materials used were rubber and plastic.

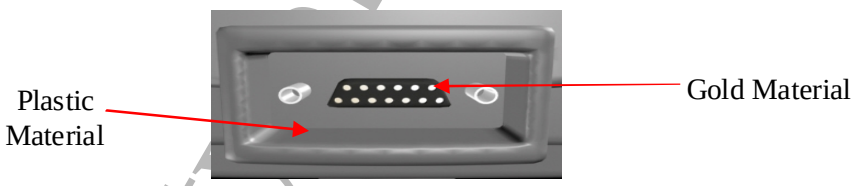

Figure 9(f): Back View

6.1.5 Final Step: Smoothing

Some parts of the Telxon can be seen to be made of the shape and thus far it could be seen that the 3D model was made up of different blocks. To smooth the different shapes together the shapes had to be added to each other using Boolean (union) and then the combined shape was modified by *Mesh Smooth*. The result of the implementation shown in Appendix E

6.1.6 Problem 1: Handle

The handle proved to be the most difficult part of the 3D implementation of the Telxon. The problem rose when the shape was rendered, where the model's surface showed defects. This was because it was created using numerous segments. Many different methods were tried and tested, after a few attempts it was proved successfully.

Solution: The segments were reduced and Boolean was used to help edit the handle instead of the modifiers.

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6.1.7 Problem 2: Shockwave (W3D)

Part of the design was to save the 3D model as a shockwave file, so that it could be imported in to director. Having used 3D Studio Max version 3R this was not possible. This version did not contain the facility to create shockwave file. An attempt was made to open a 3D model in the latest version, 3Dstudio Max 4.2 but the file failed to open.

Solution: There were only two options considered. The first option was to create the model again using a latest version of 3D studio Max. The second option was to animate the model with the current version. The later was chosen due to time constraints.

The required animation for the training modules, were carried out by using *Targeted Camera*, *time* and *key frames*. The animation was then saved as rendered and .Avi so that it could be implemented in to the training modules.

6.2.8 Problem 3: Animating

When attempting to animate using the Targeted camera, the model was not rotating in the centre of the Camera view.

Solution: The 3D model's *pivot point* was checked and found that the point was to the right of the Camera view. This was corrected to the centre and resulted in a successful animation.

6.3 Implementation of Page layout

The main layout page was created with Microsoft Front Page XP. The page was created to look simple and professional.

The cream coloured background was chosen to give the subtle and professional look. Asda is well known to be associated with the colour green, hence the colour of the navigation buttons.

Figure 10: Final Page Layout

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6.3.1 The banner:

A jpeg image consisting of the system's name was created using Adobe Photoshop 7. The image was then imported on to the top frame of the page.

6.3.2 Buttons

At first Flash buttons were implemented to each page to make the buttons appealing. The Flash buttons began presenting errors when hyperlinks were added. The buttons were then changed to different style buttons altogether, which were created using Adode Photoshop 7.

Fig 11(a): Normal Image

Fig 11(b): Rollover Image

Two sets of buttons were created for each navigation link as shown above Fig 9(a) and Fig 9(b). Using *dynamic Html affect* tool on Front page, the off button was set to *swap* with the on button on *Mouse Over*. This was created so that it gave the perception of a flash button.

6.3.3 The Logo

Implementing a logo was one of the specific requirements set. This was implemented by two images ASDA and Wal-Mart that were merged into one jpeg image using Adobe Photoshop and imported in to the top frame.

6.4 Implementing the Training Modules (level 1, 2, 3 and Telxon Guide)

These modules were created with Macromedia Director 8.5 as director movies and published in to shockwave files (Dcr.). Each Director movie was created using the same stage size of 720mm x 430mm so that it will fit in the content area of the main layout. The shockwave files were then imported to the in respective page frames via Dreamweaver.

All 4 modules implementation included text, audio, photographic images, animation and avi.

6.4.1 Animations

The animations was either created or implemented by use of the animation options on the library palette. The level of animation was kept to minimum throughout the system and the animation that was included was set to a faster tempo. This was carried out so that the modules were kept to minimal viewing time.

The creation of the animation was developed by using *Score (time line)* and *Keyframes*.

The Library Palette tool Pixlate (Sprite Transition) was used in some parts to give interaction to the user and therefore making it more appealing

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6.4.2 Photographic Images

Many images were implemented in the training module to help guide users better through the training modules.

Before all the images were imported into the cast member they were manipulated by via Adobe Photoshop to reduce the image size.

6.4.3 AVI

In all, four short video clips were taken with a JVC DV-Camera to give introduction for each training module. The files were originally large, so each clip was edited and compressed using Adobe Premiere. The Telxon Guide training module contained animated AVI, which was generated using 3D studio Max.

The clips and AVI files were imported in similar fashion to the images. The difference was that the each AVI file had to be referenced from an external source file where the video clips were located.

6.4.4 Text

The text was created using the Telxon manuals and some aspects were changed to suit the training module. The colour of the text was chosen to be white, which contradicts the background colour effectively. All text was kept to a standard font size and style to keep consistency.

6.4.5 Background Colour

The same background colour was used for all the modules. This was not only chosen to give consistency, but dark coloured backgrounds enhance the visibility of foreground images and texts. The research of HCI carried out said that blue was the ideal colour to use for background but this was not carried out because the soft cream colour on the page clashed.

6.4.6 Problem 1: Viewing the AVI files on the Web browser.

This was one of the biggest problems occurred during the implementation stage. The problem rose after the shockwave movies were implemented onto the respected page on the server. The shockwave movies would load up on the browser page, but would not display the AVI files that were present in the movie. Publish settings and other methods were tried and eventually the problem was rectified.

Solution: AVI Cast Members are not imported into the director movie. Like images they are referenced from a source path. Therefore, AVI casts members need to be referenced in the *Cast Property* as http://mmtprojects.herts.ac.uk:10080/mmt4-03/telxon/avi/*NameOfFiles*. Previously the AVI files were being reference from a local drive (c:\).

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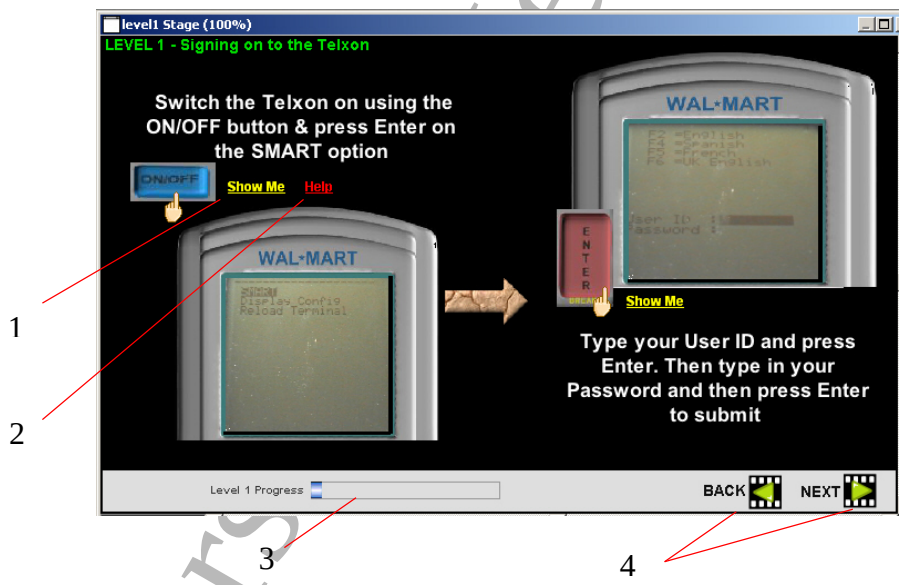
6.4.7 Problem 2: Recording Audio

Audio was first captured using a microphone and edited with the software Windows Media Editor. All the audio files needed editing to reduce the 'hissing' noise in the background. After using two different editing softwares, good quality audio files were not successfully achieved. The main problem was the microphone was of low quality and attempts were made to borrow a quality microphone from the lab technician. But due to popular demands the microphones were not available at the time. This meant another method was required to generate the audio files and after researching on the Internet, a possible solution was discovered.

Solution : TextAloudMp3 software was used to generate the audio sound.

TextAloudMp3 is a program that converts any text into voice. The program has an array of different voices both male and female. Voices can be manipulated by pitch and speed to help create perfect sound. The biggest advantage was that the voice could then be saved as either MP3 or .Wav format which was ideal since Director 8.5 enables the use of .Wav files.

Fig 12: Level 1 key Features



6.4.8 Key features

These key features were implemented in the level 1,2 and 3.

1) *Show me* options – links (Go to frame…) to a different section of the movie that shows the button to use on the keypad. This was not in the original design but was incorporated to help the users.

2) *Help* options – provides help with training for that particular section and is implemented in the same way as the *show me* option

3) *Progress bar* – indicates how far the user is from the end of the Training. This was implemented using an image of a bar (created in Photoshop). The bar was set to a zero length at the beginning of the movie and at the end is set to 30. Both the beginning and end frames were

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set as Keyframes so that the progress bar increases in length as each frame in the movie is played.

4) *Next* and *Back* (navigations) buttons were created using Photoshop and were assigned series of lingo scripts "go to frame". Each script corresponded to a frame on the *Score* where the required information is displayed.

6.4.9 Other key Feature

Mouse Over animation was incremented in some parts of the training modules to provide greater interaction for the user. An example of this is shown in Level 1 of the training module where an image of the Telxon keypad has been assigned lingo script (see code below). When a mouse pointer scrolls over the image it activates the *lingo script event* and results in a text box to be prompted describing that particular area.

Example of the code is:

```
 on mouseEnter me
  go to frame 441 - - me = the cast member
end mouseEnter

on mouseLeave me
  go to frame 440 - - Leave = exits and goes back to
end mouseLeave          its original state
```

6.5 Test Level 1 and 2 Implementation

Both tests were created using Director 8.5. The tests were constructed of 5 questions and each with four possible answers to choose from. The aim was to provide some feedback for users, showing them what they need to learn. To achieve this, the tests were developed so that if an incorrect answer was chosen the correct answer would be shown. A scoreboard was implemented in the tests to give an overview of how well they might do.

Both tests are made up of using many frames.

6.6 Database Implementation

The database was created on a single table (user) using MS Access.

In the design stage of the system, only 4 fields were suggested for implementation on a single table. This was then increased towards the end of the implementation stage to 6. Extra fields such as, Forename and Surname were added so that an extra function could be implemented on the system. These extra fields were required to be called up on the *success.asp* page, if a successful user logged in the system

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6.7 Login and Administration system Implementation

Both systems were created using ASP and Microsoft FrontPage. MS FrontPage was used to design the interface and ASP code was written using this software. Originally it was stated that Macromedia Dreamweaver was going to be used, but Front Page was used because writing and viewing ASP code was much easier than in Dreamweaver.

6.7.1 Login.asp

This page has been applied to verify the User ID and Password from the Login.htm page.
To do this, a connection to the database needed to be established. This was achieved with the following code

```
<%,
        Dim sDSN
        Dim sPath
        Dim objConnection

        sPath = Server.MapPath("./logins.mdb")
        sDSN = "DRIVER=Driver do Microsoft Access (*.mdb);UID=admin;FIL=MS Access;DBQ=" & sPath

        Set objConnection = Server.CreateObject("ADODB.Connection")
        objConnection.Open sDSN
%>
```

This code was used in all the pages that needed a connection to database.
One aim of the login.asp was to distinguish between an admin user and normal user. To do this two variables Dim bUser (normal user) Dim bSuccess (admin) were assigned true or false statements, where if bSuccess is True then the login person is admin therefore allow access to the admin section.
The page also contains scripts that give error messages if the login is incorrect.

6.7.2 Success.asp

This page created as a html page at first and towards the end of the implementation, an extra function was added to improve the system. The function was to display the forename and surname of a successful user. To do this the database was implemented with two extra fields: forename and surname. Test data was put in these filed for all the users.
To display the forename and surname the following code was incremented.

```
<%…..Response.Write objRecordset(“forename”)
        Response.Write “ “
        Response.Write objRecordset(“surname)
                                        …….%>
```

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6.7.3 Listings.asp

If an administrator logged into the system they would be sent a listing.asp automatically. Originally an administration homepage was going to be created, but as the system was small the idea was rejected.

At first this page displayed all the users and admin staffs that were on the database instead of just the users. This problem was solved by specifically making the ASP code select the fields which were not admin. This is shown below

"<%……Set objRecorddet = objConnection.Execute("SELECT*FROM users WHERE isAdmin = Fasle....%>"

6.7.4 Delete.asp

This page was responsible for deleting a User ID and Password from the listings. This was done by opening the connection to the database and requesting for the ID field to be deleted. Deleting the ID field deletes everything that is associated with that field.

6.7.5 Edit.asp

In this page code was developed to retrieve data from the database, change the data and then send it back to the database to be stored.

6.7.6 Add.asp

This page was created to allow admin staff to add new users. When the new user information is sent to the database it automatically sets the ID Admin field as false.

6.8 Other Pages (FAQ, terms and con etc…)

These pages were constructed with Front Page and HTML coding, containing just text. The FAQ page contains hyperlinks to other Help pages, which contain short help guides for different aspects of the Telxon, (points that have been shown in the training guide). This page is essentially created for the existing users of the Telxon.

6.9 Implementation Summary

During the implementation stage some problems were encountered. These were resolved effectively and efficiently. Overall this stage was completed to a satisfactorily standard.

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7. Testing

7.1 Introduction

The purpose of testing is to ensure that the system is error free and meets all its requirements. Testing took place throughout the implementation stage of the project. As each component of the system was built, it also was tested for errors.

7.2 White Box Testing.

This testing strategy tests the code that operates the system and proved to be popular of the testing methods. This includes the testing of every line of source code that is executed at least once, and/or requiring every function to be individually tested. The purpose is to build test cases to exercise those parts of the code that are likely to cause trouble. This approach was not practical for this project as most codes were generated by the software packages.

7.3 Black Box Testing

This strategy tests the functions of the system. It is known as Black Box because it does not need to know the internal machinery of the system. The Black Box Testing emphasises mainly, what the code does, not how it works. This method of testing can also be carried out by a potential end user before it is converted to a "live" system.

This strategy was chosen to test the system because it is relatively simpler to carryout given the time allocated in the project plan.
In a fairly large system the testing would be more affective if the Block Box testing was split up into smaller organised Testing stages. For each stage Test Plans were developed, see appendix F.

7.2.1 Stage 1: The system without the Content (text and shockwave movies)
Each page was tested as it was built to ensure it was free from any defects. Once each page was working sufficiently they were integrated onto the server. The purpose of this integration was to ensure that all the pages could perform the functions they were responsible for. Some unexpected responses meant that there were defects in the system. These errors were rectified and the erroneous unit was re-tested.

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Examples of Test Actions:

- Data was inputted into some of the page and the output was tested to see if the correct response.
- Checked the hyperlinks to see if they were responding to the right page

Examples of some of the problems: There were no obvious major errors, there were a few minor errors such as, broken links and some rollover buttons were not showing the right images. These were rectified without any issues.

7.2.2 Stage 2 :Shockwave Movies.

Continuous testing was applied during the implementation of the Director movies. Each individual movie was checked for faults and content error.

Examples of Test actions:

- Spelling and grammar checks
- Correct Content Terminology and processes.
- Checking for correct timing between audio and animation

7.2.3 Stage 3: The Whole System

This stage was carried when the whole system was integrated fully. Test data was added where appropriate, functions were tested in the necessary parts of the system and shockwave movies were tested for the expected results and responses. At this stage the system was also tested by the potential users

7.3User Testing (Beta Testing)

To provide insight into user's opinion on the system, the system was tested by 10 Asda employees and their feedback was recorded. The users had an opportunity to go through the system and record their opinions via a questionnaire, see Appendix G.

7.3.1 Summary of User Testing

From the questionnaire, the following were outlined.

Positives

- the site was visually pleasing to the eye
- easy to use
- well presented
- contained good relevant content
- easy to understand

Negatives

- Audio difficult to make out the sound

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8. Evaluation and Conclusion

8.1 Introduction

This chapter evaluates the overall project and assesses the approach and management conducted during the time of the project. It also includes future developments and restrictions overview.

8.2 Project Evaluation

The aims and objectives that were outlined at the start of the project were completed successfully.

The aim of the project was to provide Asda employees a training system that will teach them how to use the Telxon. This was achieved by producing an interactive training module that would provide information about the Telxon.

One of objectives was to create an accurate representation Telxon in 3D. This was achieved by using a 3D developing software called 3D Studio Max. A great deal of time and effort was applied to get the model to look identical. The result was pleasing and proved to be effective when the model was used in the training package.

The individual training modules were created with a lot of emphasis on Human - Computer Interaction and factors that make a good training package. These factors were researched and analysed thoroughly before the designing and implementation had begun.
The findings from the research were applied to both the system design stage and implementation stage. The colours used in the modules were appealing, soft and effective. This was backed up by the results of the user questionnaire that was carried in the testing stage.

Adopting multimedia into the system was crucial to help provide a good training package. Video of the author was used to introduce users to the different training modules. Audio was used to help go through the training quicker and to make the training more appealing. By including these aspects, a “high impact” package and through research, training results have been successful.

One of the major achievements of the project has been the design stage. A lot of time was spent designing in an attempt to make implementation stage more efficient. The

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different methods of designing used, proved to be useful, especially the storyboarding. This gave a step by step guide to what was suppose to be implemented.

One of the requirements was to provide interactivity for the user. This was met to a high standard throughout the system, particularly in the training modules. Each training module consisted of a 'back' and 'next' navigation buttons. These enabled the user to go the next part of the training when they were ready, and by using the back button they could go back to the previous part of the training. This was very important because not all users have the same learning pace; some need more time to gather information than others.

Special features were incremented throughout the training modules to aid the users with the training. An example of this is the *progress bar* in level 1 training module. Without it, it may lead the user to frustration, as s/he would not know when the training would end.

The training modules were all residence of a greater system, where users need the correct User ID and Password to view them. This was one of many user requirements that were successfully implemented. In addition an administration system was implemented to help admin staffs to provide create, edit and delete details.

Although the final system has not been implemented to the Asda store, the system shows to have the potential of being a great success.

8.3 Project Management

One of the major achievements has been the planning of the project. The effective planning via the Gantt has been largely been kept to schedule throughout the project. The success has been down to the correct length of time being set for the individual tasks.

Other factors, which have helped to control the project, were the regular progress meetings with the project supervisor. This enabled progress to be made to the project effectively, as some task deadlines were required to be displayed during these meetings.

There were occasions when the project work was conflicting from the project plan. Some tasks took longer to carryout and in one week due to ill health, the project was running one week behind schedule. In a normal circumstance this would not be considered as a problem, but in a project with 12 weeks completion deadline it was significant. To resolve this, the work that had to be carried out in that week was distributed over to the following two weeks.

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8.4 Alternative Methods

All systems in their early stages of development can be improved upon. Very few are successful at meeting their full requirements without any adjustments being made.

If time constraints were not a factor then the project could have been constructed using different software and techniques.

An example of this where 3D Studio Max 5 could have been used instead of version 3R used to create the model again. This latest version would enable the 3D Telxon to be saved as a shockwave (W3D) image. This can be then used more dynamically to within Director for better animation. This could also help eradicate the use of the Telxon totally. All the functions that are in the real Telxon could be implemented on to the 3D models using Macromedia Director. Director 8.5 can assign controls and responses for the 3D images.

Other Examples of alternative Methods:

Lingo could be have been used to calculate the score in the Level 1 and 2 Tests. This would make future expansion to the test much easier.

In the current system, the level 1 and level test scores are not recorded or monitored. Using different software such as Flash or Authoware.

The admin system does not have the ability to change or add new users forename and surname. Again with more time this could have been implemented to further enhance the system performance.

With the current system in place, all users can see the various training modules. Improvement can be made by the way of implementing a system that only allow the user to access the next training module only if they have passed the previous training module.

8.5 Future Work

- More Levels can be applied
- Expand to all stores to help reduce trainers
- Testing system with required pass marks can be implemented with ASDA training

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8.6 Restrictions

During the project, there were a number of restrictions that hindered the final system. Although the system was constructed to satisfactory levels, there were certain aspects which could have been improved if these restrictions were not evident.

These are explained below:

- *Screen shots of the Telxon*; clearer screenshots was unavailable due to the scratches on the all the Telxon screens that was available. This could have been overcome with a new Telxon, one that does not have any visible screen defect.
- *Using the Telxon*; The Telxon was readily unavailable due to the problems of high demand for it in the store. This caused delay in the creation of the 3D model and therefore affected the whole implementation phase
- *Interaction with the End Users*; The restriction of setting up the new system on the Asda PC, meant showing the users the progress during the design and implementation of the project was difficult. To overcome this difficulty showing the system had to be carried out by asking the user to come to the LRC or to the Authors home. This was time consuming and affected regular feedbacks from the users.
- Conversion; In the original plan in The Waterfall diagram was to convert the system. This was not possible because there was no PC to set it up with and I wasn't allowed to connect it to the server.

8.7 Executive Summary

The project has been a success and with new technology it has the potential to be used by Asda in the future. Telxon training guide provides a very successful way of training Asda employees. This was achieved through understanding the needs of the employees and the difficulties associated with Telxon. Great knowledge has been gained through the method of understanding client and user requirements, which could be later applied to industry.

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9 References

Ref 1 Page 13 http://whatis.techtarget.com/definition/0,,sid9_gci331397,00.html

Ref 2 Page 15 Faulkner, 1998, Pg1

Ref 3 Page 24 Preece, 1994, Page 462

Web References/ Websites

www.wccl.co.uk/feasibility.html

www.3dcafe.com

www.asp101.com

www.macromedia.com

www.asda.com

www.microsoft.com

www.designcommunity.com/messages/13002.html

www.designer-info.com

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10 Bibliography

Inside 3D Studio Max 3 Volume I — New Riders Publishing
Steven Elliot, Philip Miller, Jeffrey Abouaf, Dave Espinosa-Agilar, Steven Alexander, Doug Barnard, Paul Kakert, Dave Kalwick,

Inside 3D Studio Max 3 Volume II Modelling and Material — New Riders Publishing
George Masetri, Dennis Bradshaw, Jan-Erik Sjovall, Jeffrey Abouaf, Anna Hennequet, Jacques Hennequet, Angie Jones.

Inside 3D Studio Max 3 Volume III Animation — New Riders Publishing
George Masetri, Dennis Bradshaw, Jan-Erik Sjovall, Jeffrey Abouaf, Anna Hennequet, Jacques Hennequet, Angie Jones.

Dreamweaver 4 Bible
Joseph W.Lowery

Understanding Computer Science for Advanced Level — Stanley Thornes
Ray Bradley

A Level Computing — Letts
Pat Heathcote & Kevin Bond

Human Computer Interactions
Preece, J

Beginning Active Server Pages 3.0 — WROX
David Buser, John Kauffman, Juan T.Llibre, Brian Francis, David Sussman, Chris Ullman, Jon Duckett

The Essence of Human – Computer Interaction
Faulkner.C, 1998

Director in a Nutshell 2nd edition — O'RIELLY

Bruce A. Epstein

Macromedia Director 8 & Lingo. — Prima Tech
Thomas J.Green

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11 Appendices

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Appendix A

11.1 Appendix A - Interview Questions

Q1:How important is the Telxon to your store?

Q2: How would you asses the current Telxon training system?

Q3: Do you think there are any problems with the training system? If so why do think it occurs?

Q4: What help is available if your colleague encounter problems with the Telxon?

Q5: Do you having a computerised system would help this store?

Q6: What features would you like to see if a new training system was implemeneted?

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Appendix B

11.2 Appendix B - Questionnaire for Telxon users

Please read the questions and tick where appropriate.

If you have any queries about the content or don't understand any part of a question, please just ask me, and I will explain.

1) Are you a Part Time ◯ or a Full Time ◯ **colleague?**

2) How effective do you think the current training system is

Very ◯ Satisfactory ◯ Could be improved ◯

3) Has there been a time when you have forgotten how to do something on the Telxon?

Yes ◯ No ◯

4) Have you found it difficult to get help with Telxon?

Yes ◯ No ◯

5) If you encounter a problem with the Telxon, what procedure would you follow?

Use the User Manual ◯ Ask Another colleague ◯ Neither ◯

6) Would you like to have a computerised training system?

Yes ◯ No ◯

7) Would you like to have a computerised training system?

Yes ◯ No ◯ Neither ◯

8) Any suggestions of how training could be improved?

_____

_____

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Appendix C

11.3 Appendix C – Gantt Chart

Activities \ Weeks	1	2	3	4	5	6	7	8	9	10 - 14	15	16	17	18
Think off an idea of a final year project and register the proposal via Plato Registration	*													
Investigate the proposed idea using various techniques and develop a problem definition (A)		*												
Carry out a Feasibility Study on the proposed idea. Document findings (B)		*												
Requirement Analysis – develop aims, objectives and suitable working method (C)		*	*											
Document and submit the complete Feasibility Study			*											
System Design (D) - Content Preparation				*										
- Content Flowchart					*									
- Navigation Design					*									
- Layout Design and Storyboards						*								
-Document all above stages				*	*	*	*							
Implementation and coding (E & F) - Database using MS Access								*						
- Module pages (Training Guides) including animation, 3D imaging and video capture									*	*				
- ASP coding										*				
- Database access (ADO)										*				
Testing (E & F) and Further Implementation (if required)								*	*	*	*			
Project Demonstration												*		
Software Development Manual													*	
Evaluation of the new system and Submission of Project Report														*
Research – into everything including program language and content	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Maintenance (G)	Ongoing after the launch of the new system													

Gantt Chart showing key tasks to be carried out over the 18 week period

Key:

Week1: 27/1/2003

Week 10-14: Easter Vacation

(A)…(G): Stages of Systems Life Cycle

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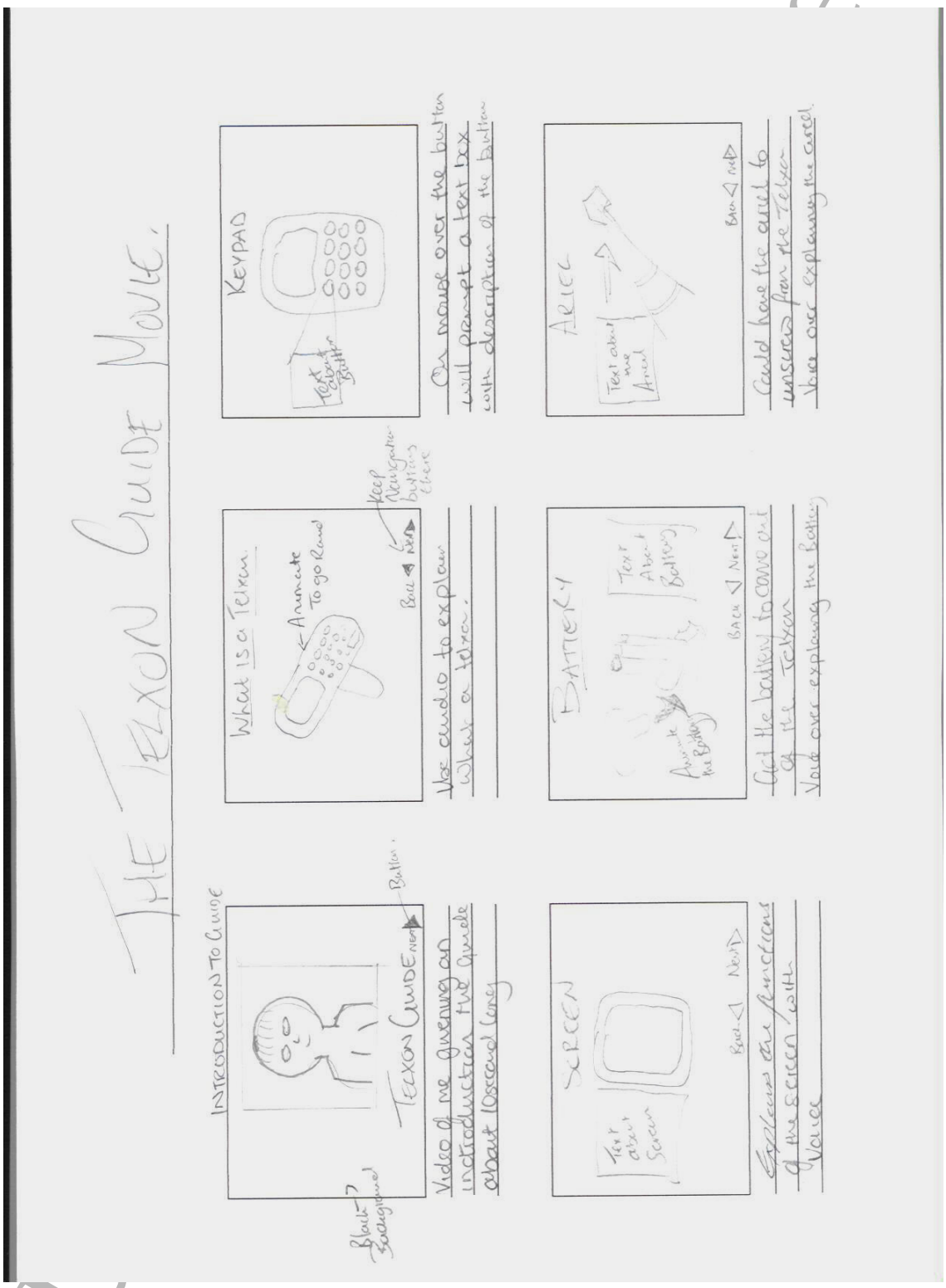
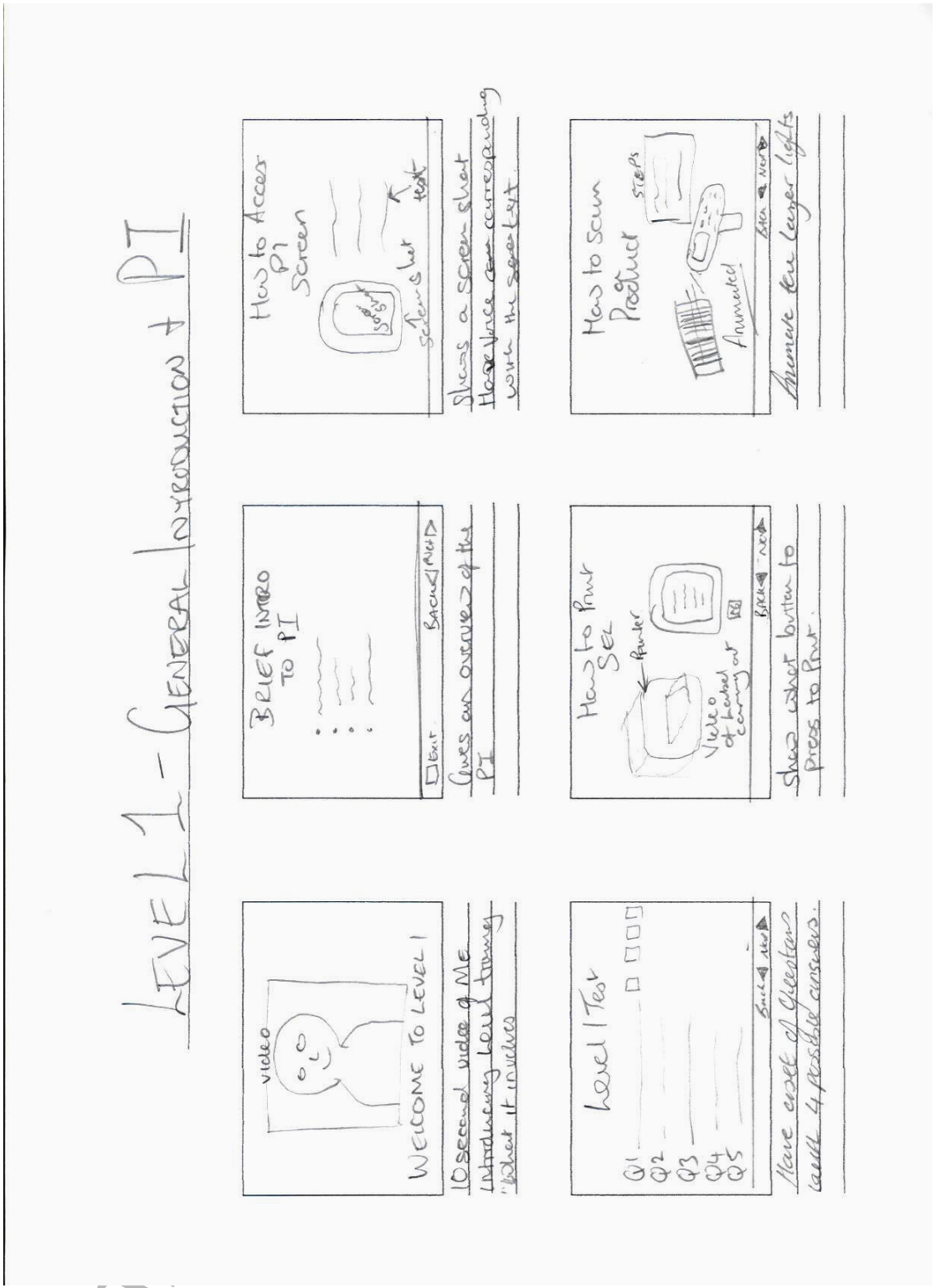
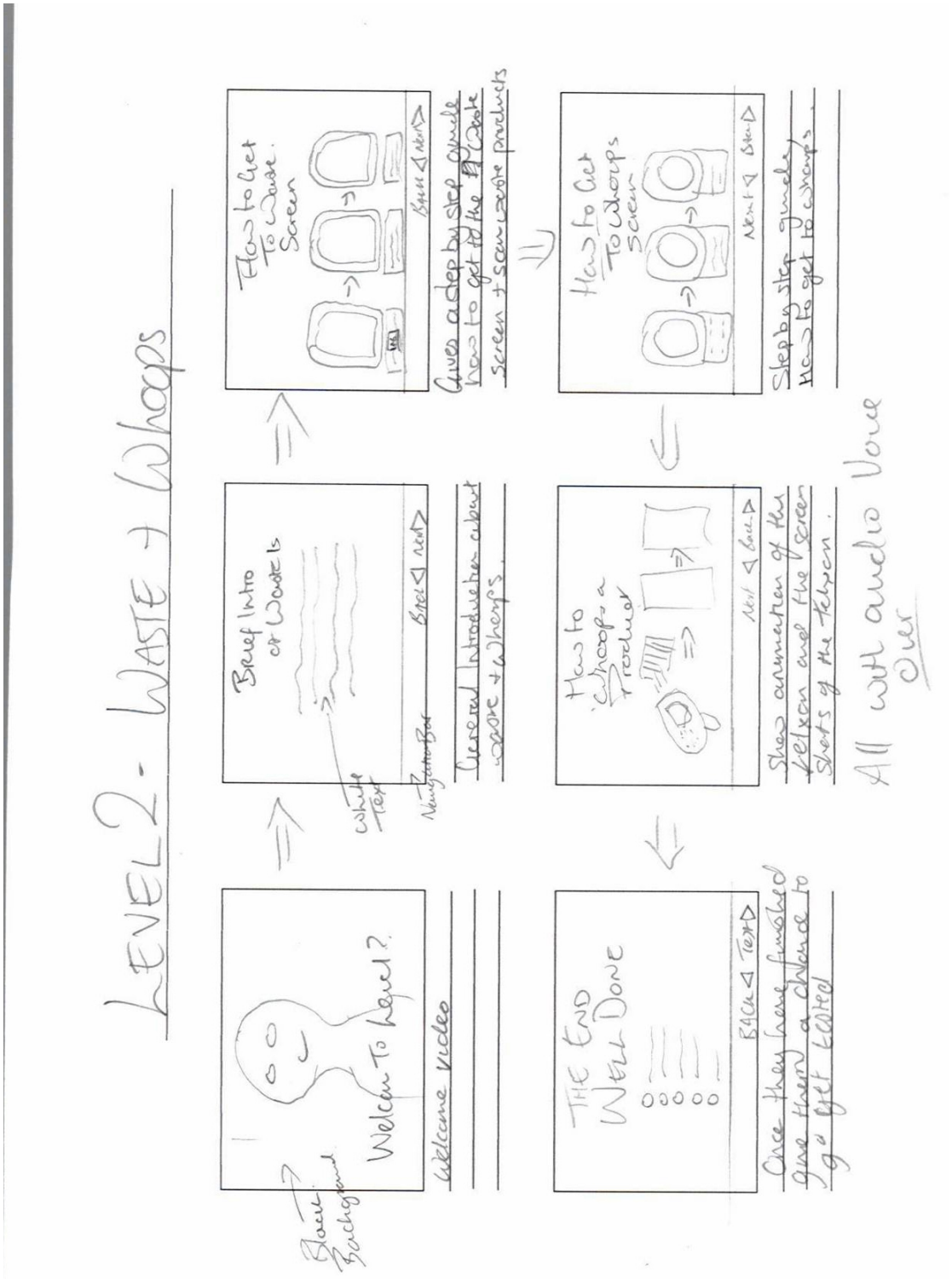
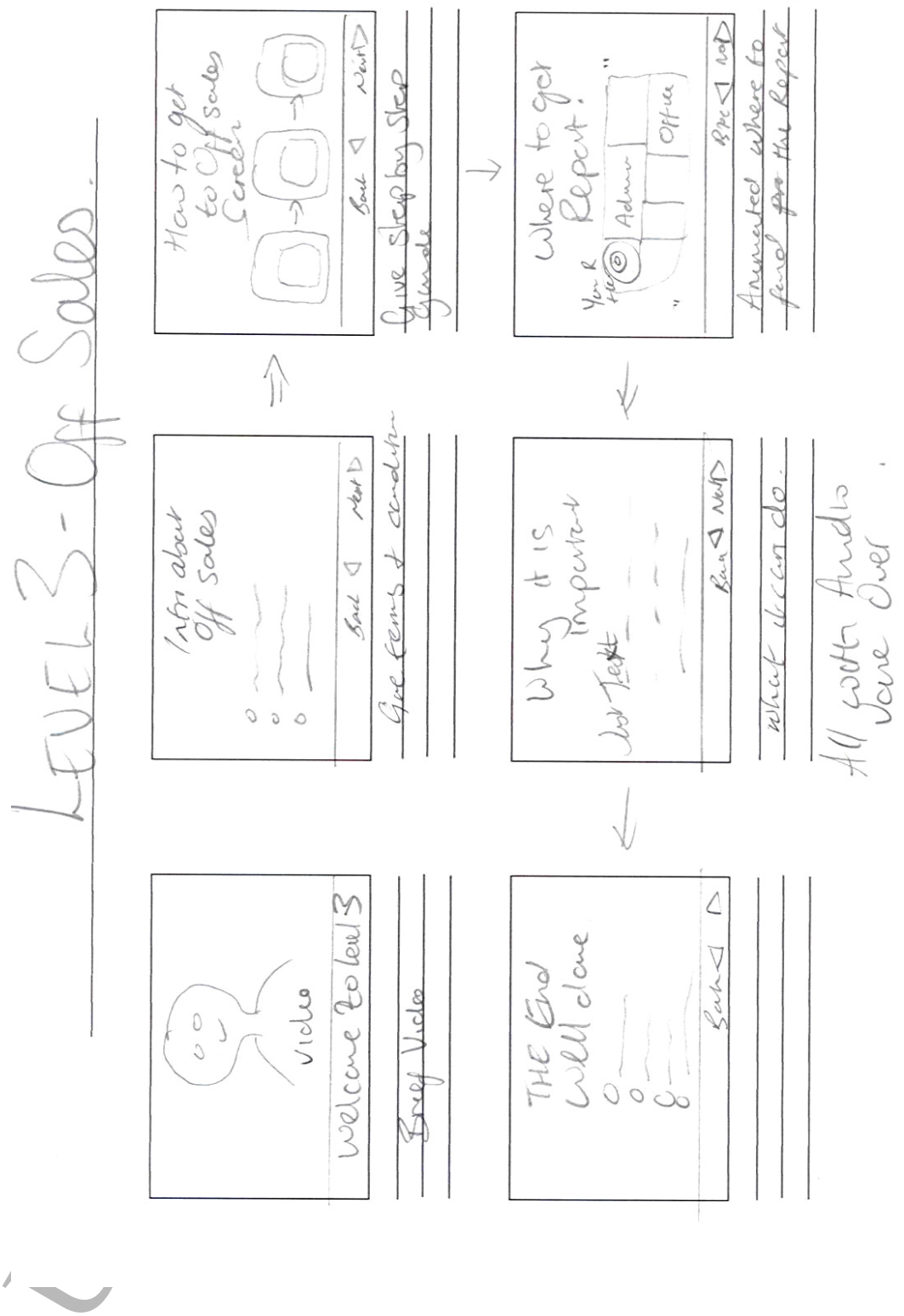
Appendix D

11.4 Appendix D – Story Board




LEVEL 1 - General Introduction + PT
video
WELCOME TO LEVEL 1
10 second video of Me introducing level themes
Level 1 Test
Q1
Q2
Q3
Q4
Q5
Have exact # of questions with 4 possible answers.
BRIEF INTRO TO PT
Exit
Gives an overview of the PT
How to Pair Set
Pairer
Video of Pairer scanning
Show short button to press to Pair.
How to Access P1 Screen
Select
Shows a screen shot How to access corresponding with the text
How to Scan Product
STEPS
Animated
Illuminate Red Laser Lights


LEVEL 2 - WASTE + Whoops
Welcome To Level 2
Welcome video
Brief Intro of Waste Is
Cleared | Introduction about waste + whoops.
How to Get To Waste Screen
Given a step by step guide how to get to the Waste screen + scan waste products
How to Get To Whoops Screen
Step by step guide how to get to whoops
How to Whoops a product
Show animation of the telxon and the screen shots of the Telxon.
THE END
WELL DONE
Once they have finished give them a Certificate to get Loaded
All with audio Voice Over


LEVEL 3 - Off Sales
Video
Welcome to level 3
Brief Video
Info about Off Sales
Back
Next
Give items & conditions
How to get to Off Sales Screen
Back
Next
Give Step by Step Guide
Where to get Report!
Admin
Office
Back
Next
Animated where to find the Report
Why it is Important
Just Text
Back
Next
Which screen do.
THE End Well done
Back
All goes Auto Save Over

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Appendix E

11.5 Appendix E - 3D Image Vs Photo Image

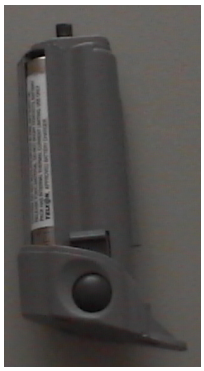


Photo Image

3D Image

Photo Image

3D Image

Photo Image

3D Image

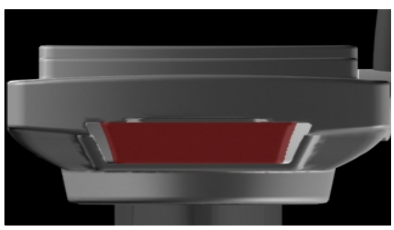
Photo Image

3D Image

3D Image

Photo Image

Photo Image



3D Image

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Photo Image

3D Image

3D Image

Photo Image

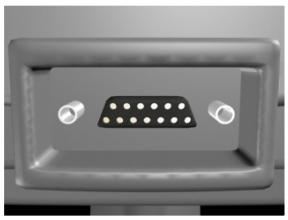

Photo Image

3D Image

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Appendix F

11.6 Appendix F – Test Plan

Test	Test Case	Expected Result	Yes/No
Stage 1			
1	Testing Link on Home Page	When button is pressed it should go to the corresponding web	Yes
2	Test all the sub page links to their relevant pages	When button is pressed it should go to the corresponding sub pages	Yes
3	Enter false user name in the login page	Error Page should appear	Yes
4	Enter correct user name in the login page	Go to users page (success.asp)	Yes
5	Put correct admin and password	Display the list of users on the page	Yes
6	Select 'add' new user and enter 'new user id' and password	Should go to listing showing new entry	Yes
7	Select a user and press delete	Name is removed from the list	Yes
Stage 2			
8	Navigate through all menu's	Go to relevant section of the animation	Yes
9	See if video and animations appear in the right place	Video and animation appear in correct places	Yes
10	Test Level 1 test to see if the score changes when an incorrect answer is pressed	Move to next question while score remains the as previous	Yes
11	Test Level 1 test to see if the score changes when a correct answer is pressed	Score increments by 1 and moves to the next question	Yes
Stage 3			
12	On home page does the intro movie play	Movie of Telxon plays	Yes

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Appendix G

11.7 Appendix G – User Testing

QUESTIONNAIRE

Please read the questions and circle your answer.

If you have any queries about the content or don't understand any part of a question, please just ask me, and I will explain.

1. **Are you an existing Telxon user?**

   Yes No

2. **How easy did you find navigating around the Comprehensive Telxon Training Guide?**

   Very easily Easily Neither Little difficulty Great difficulty

3. **Do you think the new system is very effective?**

   Strongly agree Agree Neither Disagree Strongly disagree

4. **How would you rate the effectiveness of the training modules (About Telxon, level 1, level 2, level 3)?**

   Very good Good Neither Bad Very Bad

5. **How useful are the additional functions *e.g. show me and help options*?**

   Very good Good Neither Bad Very Bad

6. **How would you rate the overall layout and design of the Comprehensive Telxon Training Guide?**

   Very good Good Neither Bad Very Bad

7. **The Comprehensive Telxon Training Guide contains a good colour scheme?**

   Strongly agree Agree Neither Disagree Strongly disagree

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8. The audio system improved the Comprehensive Telxon Training Guide training?

Strongly agree Agree Neither Disagree Strongly disagree

9. Would you like to see the Comprehensive Telxon Training Guide introduced to your store permanently?

Strongly agree Agree Neither Disagree Strongly disagree

10. The tests at level 1 and 2 were useful?

Strongly agree Agree Neither Disagree Strongly disagree

THANK YOU FOR YOU TIME AND COOPERATION

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